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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/994,142	11/26/2001	Meijie Zhang	P24,841-A USA	9602

7590 10/04/2006

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EXAMINER

DOVE, TRACY MAE

ART UNIT PAPER NUMBER

1745

DATE MAILED: 10/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/994,142

Applicant(s)

ZHANG, MEIJIE

Examiner

Tracy Dove

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,7-13,27,29 and 31-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,7-13,27,29 and 31-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 7/31/06. Applicant's arguments have been considered, but are not persuasive. Claims 1, 3, 7-13, 27, 29 and 31-38 are pending. Claims 2, 4-6, 14-26, 28 and 30 are canceled.

#### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/31/06 has been entered.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3, 7-13, 27, 29 and 31-38 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 27 recite "an aqueous 0.05 to 0.15 wt% lithium borate solution", which is not supported by the specification as filed. Applicant states Figure 2, 4 and 5 support the added limitation. However, Figures 2, 4 and 5 show the weight percent of lithium

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borate by weight of the lithium transition metal oxide powder in the produced active cathode material. The figures do not disclose the lithium borate percentage of the aqueous solution.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3, 9, 10, 12, 13, 29, 34, 35, 37 and 38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3 and 29 recites “an aqueous 0.05 to 0.15 wt% lithium borate solution”, which lacks proper antecedent basis. Examiner suggests “the aqueous...”.

Claims 9, 10, 34 and 35 recites the anodes comprises a carbonaceous insertion compound. However, claim 1 (from which claims 9 and 10 depend) and claim 27 (from which claims 34 and 35 depend) recite the anode is a lithium compound.

Claims 12 and 37 recites “a cyclic and/or linear organic carbonate”, which is improper group language. The term “and/or” is indefinite because it is unclear what the claim encompasses. Examiner suggests “at least one of a cyclic organic carbonate or a linear organic carbonate”.

### ***Claims Analysis***

The term “LiCoO<sub>2</sub> type structure” in the claims is defined by the specification at page 3, lines 28-30. A “LiCoO<sub>2</sub> type structure” is defined as LiCoO<sub>2</sub> or LiNi<sub>x</sub>Co<sub>1-x</sub>O<sub>2</sub> ( $0 \leq x \leq 1$ ).

The specification recites the term “lithium borate” is used to refer to any lithium-boron-oxide compound (page 8, lines 1-2).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 7-12, 27, 29 and 31-37 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, and alternatively unpatentable over, Uehara et al., JP 09-330720 (a machine translation of the Japanese patent is attached).

Uehara teaches a lithium battery having a positive electrode including a lithium transition metal compound oxide, a negative electrode including a lithium material or a material capable of storing and releasing lithium ion, and a nonaqueous electrolyte. At least part of the particle surface of the lithium transition metal compound oxide is covered with a compound containing lithium and boron. Uehara teaches a lithium battery having reduced capacity fade rate (abstract). A multiple oxide containing lithium and boron such as  $\text{LiBO}_2$  or  $\text{Li}_2\text{B}_4\text{O}_7$  may be used to cover the lithium transition metal compound positive electrode material (0011). The coating compound is contained in an amount of 0.1-20% based on the lithium transition metal compound (0012). The lithium transition metal compound positive electrode material may be

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$\text{LiNi}_{0.5}\text{Co}_{0.5}\text{O}_2$  (0032). The negative electrode material may be lithium, a lithium alloy (lithium compound anode) or a carbon material such as graphite (0016). The electrode includes an electrolyte salt such as  $\text{LiPF}_6$  and an organic solvent such as propylene carbonate, ethylene carbonate, diethyl carbonate, dimethyl carbonate or mixtures thereof (0018-0019). Uehara teaches the lithium transition metal oxide and the lithium-boron-oxide containing compound are mixed and heated to a temperature of  $650^\circ\text{C}$  (0039 and 0044). The battery includes a separator 3, as shown in Figure 1. The compound  $\text{LiCoO}_2$  is encompassed by the general formula (1) disclosed by Uehara in paragraph 0014. Example 11 in Table 2 teaches  $\text{LiNi}_{0.5}\text{Co}_{0.5}\text{O}_2$  with a coating of 2 mol% of  $\text{LiBO}_2$  (approximately 1 wt% of  $\text{LiBO}_2$ ).

Thus the claims are anticipated.

The claims are alternatively unpatentable because the courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious. See MPEP 2113. The heat treatment temperature of Uehara ( $650^\circ\text{C}$ ) is outside of the heat treatment temperature range of the claimed invention ( $250^\circ\text{C}$  to  $450^\circ\text{C}$ ). However, the coated positive electrode material of Uehara and the coated positive electrode material of the claimed invention appear to be the same. Furthermore, the limitation “the lithium borate is an aqueous 0.05 to 0.15 wt% lithium borate solution or an aqueous lithium borate hydrate solution” is a product-by-process limitation that is not given patentable weight. Only limitations of the active cathode material contained in the claimed lithium battery will be given patentable weight unless evidence of unexpected results is provided. The evidence must distinguish the claimed invention over the prior art of record.

Claims 3 and 29 contain product-by-process limitations which are considered obvious in the absence of unexpected results. See MPEP 2113. Specifically, whether the lithium borate and

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lithium insertion compound are dry mixed or mixed in an aqueous solution, the coated lithium insertion compound, as an end result, appears to be the same.

»

Claims 13 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al., JP 09-330720 in view of Gosho et al., US 6,589,694.

Uehara teaches a lithium battery having a positive electrode including a lithium transition metal compound oxide, a negative electrode including a lithium material or a material capable of storing and releasing lithium ion, and a nonaqueous electrolyte. At least part of the particle surface of the lithium transition metal compound oxide is covered with a compound containing lithium and boron. Uehara teaches a lithium battery having reduced capacity fade rate (abstract). A multiple oxide containing lithium and boron such as  $\text{LiBO}_2$  or  $\text{Li}_2\text{B}_4\text{O}_7$  may be used to cover the lithium transition metal compound positive electrode material (0011). The coating compound is contained in an amount of 0.1-20% based on the lithium transition metal compound (0012). The lithium transition metal compound positive electrode material may be  $\text{LiNi}_{0.5}\text{Co}_{0.5}\text{O}_2$  (0032). The negative electrode material may be lithium, a lithium alloy or a carbon material such as graphite (0016). The electrode includes an electrolyte salt such as  $\text{LiPF}_6$  and an organic solvent such as propylene carbonate, ethylene carbonate, diethyl carbonate, dimethyl carbonate or mixtures thereof (0018-0019). Uehara teaches the lithium transition metal oxide and the lithium-boron-oxide containing compound are mixed and heated to a temperature of  $650^\circ\text{C}$  (0039 and 0044). The battery includes a separator 3, as shown in Figure 1. The compound  $\text{LiCoO}_2$  is encompassed by the general formula (1) disclosed by Uehara in paragraph

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0014. Example 11 in Table 2 teaches  $\text{LiNi}_{0.5}\text{Co}_{0.5}\text{O}_2$  with a coating of 2 mol% of  $\text{LiBO}_2$  (approximately 1 wt% of  $\text{LiBO}_2$ ).

Uehara does not explicitly teach that the nonaqueous solvent is a mixture of ethylene carbonate (EC), propylene carbonate (PC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC) and dimethyl carbonate (DMC).

However, Gosho teaches lithium secondary battery having positive electrode including a lithium transition metal composite oxide active material, a negative electrode including a graphite active material and a nonaqueous electrolyte including a salt and a solvent (col. 8, lines 15-48). The lithium transition metal composite oxide is preferably a Li-Co type composite oxide, particularly preferably  $\text{LiCoO}_2$  (col. 6, lines 14-23). Table 9 discloses various nonaqueous electrolytes having an  $\text{LiPF}_6$  salt and a solvent mixture of EC, PC, DEC, EMC and DMC (Ex. 30-34, 36 and 37).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to use the organic solvent mixture of Gosho for the organic solvent of Uehara in order to inhibit lowering of discharge capacity and intermediate voltage at low temperature. One of skill would have been motivated to adjust the mixing ratio of the components of the electrolyte solvent to improve low temperature characteristics of the battery (col. 31, lines 65-col. 32, lines 4). Uehara discloses using EC, PC, DEC and DMC as organic solvents for the electrolyte (only EMC is not disclosed by Uehara). One of skill would have been motivated to combine the teaching of Uehara and Gosho because both are directed toward lithium secondary batteries having lithium transition metal oxide positive electrodes and graphite negative electrode. Both references teach



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nonaqueous electrolytes having a  $\text{LiPF}_6$  salt and a solvent containing cyclic and linear organic carbonate solvents.

### ***Response to Arguments***

Applicant's arguments filed 7/31/06 have been fully considered but they are not persuasive.

The declaration under 37 CFR 1.132 filed 11/7/05 is insufficient to overcome the rejection of claims 1, 3, 7-12, 27, 29 and 30-37 based upon Uehara. The declaration states "the most important difference is that Uehara uses a test cell with a lithium metal anode rather than a lithium ion cell". However, Uehara is not limited to any specific example. Uehara teaches the lithium cell may comprise a negative electrode material such as lithium metal, lithium alloys or a carbon material for occlusion of a lithium ion (0016). Thus, Uehara teaches a lithium ion cell. Examiner points out the claim limitation "lithium compound anode" encompasses a lithium alloy material. Certain arguments presented in the declaration are not commensurate in scope with the claimed invention. For example, the declaration states "Uehara used coin cells, whereas the present application used spirally wound cells with much thinner electrodes". The claims do not contain any limitations regarding cell construction or electrode thickness. Portions of the declaration appear to be speculation and are not supported by evidence (see paragraphs 8-11).

The declaration does not properly compare the lithium battery of the claimed invention with the lithium battery of the prior art (Uehara). Therefore, the declaration is ineffective to overcome the rejection in view of Uehara.

Applicant argues Uehara does not teach a lithium borate hydrate. Examiner points out that claims 1 and 27 recite "an aqueous lithium borate solution" (no hydrate required).

Applicant argues Uehara does not anticipate the claimed invention because independent claims 1 and 27 recite an aqueous 0.05 to 0.15 wt% lithium borate solution or an aqueous lithium borate hydrate solution. However, this limitation is not given patentable weight because it is a product-by-process limitation. The limitation “an aqueous 0.05 to 0.15 wt% lithium borate solution or an aqueous lithium borate hydrate solution” is not given patentable weight because the lithium borate is not an “aqueous solution” or “a hydrate” after being heat treated. The courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious. See MPEP 2113.

Applicant asserts unexpected results are shown in Figure 5 of the present application. However, the results shown in Figure 5 are not commensurate in scope with the claimed invention. The results shown in Figure 5 are obtained for a specific amount (0.15%) of lithium borate. Claim 1 does not contain any limitations regarding the amount of lithium borate contained in the cathode powder and claim 27 recites a broader range for the amount of lithium borate by weight of the cathode powder. Furthermore, unexpected results must distinguish the claimed invention over the prior art. Specifically, Applicant must show the *battery* of the claimed invention has improved capacity fade rate over the *battery* of the prior art.

The 35 U.S.C. 103(a) rejection in view of Uehara and Gosho is maintained. Applicant argues that neither Uehara nor Gosho teach the heating temperature of the claimed invention. However, the heating temperature is a product-by-process limitation. See arguments above regarding the Uehara reference.

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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



**TRACY DOVE**  
**PRIMARY EXAMINER**

September 29, 2006